FORM PTO-1390 (REV. 11-2000) U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

# TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

| ATTORNEY 'S DOCKET NUMBER | U S. APPLICATION NO (If known, see 37 CFR 1 5 |
|---|---|
| I-2-127.1US | 09/880391 Not Yet Known |

| INTERNATIONAL APPLICATION NO. | INTERNATIONAL FILING DATE | PRIORITY DATE CLAIMED |
|---|---|---|
| PCT/US99/20652 | 12/23/2001 | 02/05/1999 |

TITLE OF INVENTION: COMMUNICATION STATION WITH AUTOMATIC CABLE LOSS COMPENSATION

APPLICANT(S) FOR DO/EO/US: John Bird and Leonid Kazakevich

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [x] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [ ] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [ ] This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. [ ] The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. [x] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [x] is attached hereto (required only if not communicated by the International Bureau).
   b. [ ] has been communicated by the International Bureau.
   c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [ ] An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
   a. [ ] is attached hereto.
   b. [ ] has been previously submitted under 35 U.S.C. 154(d)(4).
7. [x] Amendments to the claims of the International Aplication under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [ ] are attached hereto (required only if not communicated by the International Bureau).
   b. [ ] have been communicated by the International Bureau.
   c. [ ] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [x] have not been made and will not be made.
8. [ ] An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. [x] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [ ] An English lanugage translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

**Items 11 to 20 below concern document(s) or information included:**

11. [ ] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [x] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [ ] A FIRST preliminary amendment.
14. [ ] A SECOND or SUBSEQUENT preliminary amendment.
15. [x] A substitute specification.
16. [ ] A change of power of attorney and/or address letter.
17. [ ] A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. [ ] A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. [ ] A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. [x] Other items or information:
    1) Four (4) sheets of Drawings in triplicate; 2) Copy of the Published International Application with Search Report; 3) Copy of the International Preliminary Examination Report with Annex of Amended Sheets; 4) Communication Regarding Substitute Specification; and 5) Application Data Sheet.

| U.S. APPLICATION NO (if known, see 37 CFR 1.5) | INTERNATIONAL APPLICATION NO | ATTORNEY'S DOCKET NUMBER |
|---|---|---|
| 09/890391 Not Yet Known | PCT/US99/20652 | I-2-127.1US |

21. [x] The following fees are submitted:

| | CALCULATIONS PTO USE ONLY | |
|---|---|---|
| **BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):** | | |
| Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... **$1000.00** | | |
| International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... **$860.00** | | |
| International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... **$710.00** | | |
| International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... **$690.00** | | |
| International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) ..... **$100.00** | | |
| **ENTER APPROPRIATE BASIC FEE AMOUNT =** | $ 860.00 | |
| Surcharge of **$130.00** for furnishing the oath or declaration later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(e)). | $ | |

| CLAIMS | NUMBER FILED | NUMBER EXTRA | RATE | | |
|---|---|---|---|---|---|
| Total claims | 16 - 20 = | 0 | x **$18.00** | $ 0.00 | |
| Independent claims | 3 - 3 = | 0 | x **$80.00** | $ 0.00 | |
| MULTIPLE DEPENDENT CLAIM(S) (if applicable) | | | + **$270.00** | $ 0.00 | |
| **TOTAL OF ABOVE CALCULATIONS =** | | | | $ 860.00 | |
| [ ] Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2. + | | | | $ | |
| **SUBTOTAL =** | | | | $ 860.00 | |
| Processing fee of **$130.00** for furnishing the English translation later than [ ] 20 [ ] 30 months from the earliest claimed priority date (37 CFR 1.492(f)). | | | | $ | |
| **TOTAL NATIONAL FEE =** | | | | $ 860.00 | |
| Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property + | | | | $ 40.00 | |
| **TOTAL FEES ENCLOSED =** | | | | $ 900.00 | |
| | | | | **Amount to be refunded:** | $ |
| | | | | **charged:** | $ |

a. [ ] A check in the amount of $ _____ to cover the above fees is enclosed.

b. [x] Please charge my Deposit Account No. 22-0493 in the amount of $ 900.00 to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [x] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 22-0493 . A duplicate copy of this sheet is enclosed.

d. [ ] Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

**NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.**

SEND ALL CORRESPONDENCE TO:
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SIGNATURE
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NAME
37,633
REGISTRATION NUMBER

# COMMUNICATION STATION WITH AUTOMATIC CABLE LOSS COMPENSATION

## BACKGROUND OF THE INVENTION

### Field of the Invention

The present invention relates to wireless digital communications systems. More particularly, the present invention relates to a code-division multiple access (CDMA) communication system employing a base station having remotely located RF power amplification equipment.

### Description of the Prior Art

CDMA systems provide an efficient use of the limited bandwidth of the RF spectrum, thereby permitting a greater amount of information transmission with less signal distortion than communications systems using other techniques, such as time division multiple access and frequency division multiple access.

In a CDMA communication system, an information signal at the transmitter is mixed with a pseudorandom spreading code which spreads the information across the entire bandwidth employed by the system. The spread signal is upconverted to an RF signal for transmission. A receiver, identified by the pseudorandom spreading code, downconverts the transmitted spread-spectrum signal and mixes this with the pseudorandom spreading code to reproduce the original information signal.

A prior art CDMA communication system is shown in **Figure 1**. The communication system has a plurality of base stations $\mathbf{20_1}$, $\mathbf{20_2}$, ... $\mathbf{20_n}$ connected together through land lines via a local public switched telephone network (PSTN)

or by a wireless link. Each base station $20_1, 20_2, \ldots 20_n$ communicates using spread spectrum CDMA transmissions with mobile and field subscriber units stations $22_1$, $22_2, \ldots 22_n$ located within its cellular area. Because a signal transmitted from one base station appears as noise to another base station, and thereby interferes with the ability of the second base station to receive transmissions from subscriber units located within its cellular area, it is desirable to carefully limit the amount of power transmitted from each base station $20_1, 20_2, \ldots 20_n$.

A CDMA base station typically has equipment such as an RF power amplifier and related electronics (not shown) located in a sheltered ground station for reception and transmission of RF signals and an antenna, or multiple antennae, mounted at some distance from the sheltered ground station. A significant amount of RF energy is lost through the cable connecting the ground station to the antenna. Accordingly, it is advantageous to co-locate or integrate the RF amplifier and related electronics with the antenna. This arrangement results in cost savings and energy efficiency because it permits the use of a lower power RF amplifier than is necessary when the RF amplifier is located at a distance from the antenna. Although RF power is still lost in the cable which connects the ground station with the RF amplifier located at the antenna, far less power is lost than in the case where the RF amplifier is located in the ground station.

In order to control the amount of power transmitted at the antenna, the power loss through the cable must be measured and compensated. In addition, the power loss through the cable varies with temperature. This variability causes a variation in

signal level to the RF amplifier, which can result in overpowering or underpowering the RF amplifier. Overpowering the RF amplifier can cause interference with neighboring cell sites and can cause distortion of the transmitted signal which produces additional undesirable noise. Underpowering the RF amplifier can result in the transmission of a signal that is too weak to effectively communicate with the subscriber units within the cell area of the transmitter.

U.S. Patent No. 5,634,191 discloses an arrangement for a TDMA system for compensating for cable loss between separate communication system units. The transmit power level of the communication is quantized at the first communication unit and sent as data together with the communication signal to the second communication unit. At the second communication unit, the power level of the communication is again measured and compared to the quantized power level. A signal attenuator adjusts the communication power level at the second communication unit to be equivalent to the quantized power level.

The measurement of the power of an RF signal received by a base station is also critical to an effective CDMA system. Since this measurement is typically made at the ground station, variability in power loss through the cable also adversely affects the accuracy of the received power measurement.

Accordingly, there is a need for continuous, automatic compensation of the power loss in the cable between the antenna and the ground station in order to effectively control RF transmission power from the base station and more accurately to measure power received from subscriber units.

## SUMMARY OF THE INVENTION

The present invention compensates for the variability of transmitted RF signal levels in a CDMA system where a cable connects ground-based low signal level RF equipment with remotely located RF power amplification equipment. The RF signal level is measured at the ground-based RF equipment end of the cable and also at the RF power amplifier equipment end of the cable. Changes in the loss across the cable are compensated with variable attenuators.

Accordingly, it is an object of the present invention to provide automatic cable loss compensation for a CDMA communication station having remotely located RF power amplification equipment

Other objects and advantages of the present invention will become apparent after reading the detailed description of the presently preferred embodiment.

## BRIEF DESCRIPTION OF THE DRAWINGS

**Figure 1** is an illustration of a prior art CDMA system.

**Figure 2** is an illustration of a base station made in accordance with the present invention with an RF power amplifier located remotely from a ground station.

**Figure 3** is a block diagram of a CDMA ground station with remotely located RF power amplifier and antenna in accordance with the present invention.

**Figure 4** is a flow diagram of a method for adjusting cable compensation attenuators in accordance with the present invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

The preferred embodiments will be described with reference to the drawing figures where like numerals represent like elements throughout.

A communications network employing the present invention is shown in **Figure 1.** The communications network includes a plurality of base stations $\mathbf{20_1}$, $\mathbf{20_2}$, ... $\mathbf{20_n}$, each of which supports wireless communication with mobile and fixed

subscriber units $22_1$, $22_2$, ... $22_n$ that are located within the coverage area of the respective base station $20_1$, $20_2$, ... $20_n$.

Referring to **Figure 2**, a base station **100** with ground-based receiving and transmitting equipment **300**, a remotely located mast head unit **320** and an antenna **360** mounted upon a tower **112** is shown. The mast head unit **320** includes an RF power amplifier and related electronics. A coaxial cable **340** conveys RF signals between the ground-based equipment **300** and the mast head unit **320**. These signals include the incoming signals which are received from subscriber units $22_1$, $22_2$, ... $22_n$ at the antenna **360**, processed by the mast head unit **320** and forwarded to the ground-based equipment **300**; and the outgoing signals which are received by the ground-based equipment **300** forwarded to the mast head unit **320** and transmitted to the subscriber units $22_1$, $22_2$, ... $22_n$. A separate cable assembly **350** conveys amplifier prime power and control signals to and from the mast head unit **320**.

A detailed schematic of a base station **100** with a remotely located RF power amplifier is shown in **Figure 3**. The ground-based equipment **300** receives a signal to be transmitted (Tx), which has already been upconverted to the desired transmission frequency. An infinitely variable attenuator **308** adjusts the Tx signal level to limit power output as appropriate for the transmission area (cell size) of the base station **100**. A touchpad front panel control **310** permits manual adjustment of the cell size attenuator **308**. This adjustment is controlled by a microcontroller **311** which may also receive a command via a communications link **313** to provide remote adjustment of the cell size attenuator **308**.

The level-adjusted Tx signal is level adjusted a second time by a variable cable compensation attenuator **401** and is buffered by a transmission preamplifier **309**. A first power level detector **402** measures the power of the level adjusted Tx signal and the Tx signal is then forwarded through an input signal diplexer **307** to the RF cable **340**. A diplexer allows bidirectional transmission of signals on a single cable. Thus, the input signal diplexer **307** and output signal diplexer **301** permit the level-adjusted Tx signal to be sent on the RF cable **340** while also simultaneously permitting reception of a level-adjusted received (Rx) signal from the mast head unit **320**.

The Tx signal is sent through the RF cable **340** to an output diplexer **301** in the mast head unit **320**. A second power level detector **403** in the mast head unit **320** measures the power of the signal to be transmitted after it has passed through the input diplexer **301**. The signal is then amplified by a high power amplifier (HPA) **304** and routed through an antenna diplexer **303** for transmission by the antenna **360.** Power for the electronics in the mast head unit **320** and other control signals are supplied from the ground-based equipment **300** by power and control cable **350**.

A signal from a subscriber unit $22_1$, $22_2$, ... $22_n$ which is received at the antenna **360**, is routed through the antenna diplexer **303** to a low noise amplifier (LNA) **302.** The received (Rx) signal is amplified by the LNA **302** and routed through the output diplexer **301** and then is conveyed to the ground based equipment **300** through the RF cable **340.** The Rx signal is stripped off the RF cable **340** by the input diplexer **307**. The received signal is level adjusted by a second variable cable

compensation attenuator **404** and then buffered by an amplifier **306** and routed to downconverter equipment (not shown).

A microcontroller **305** in the mast head unit **320** sends the power measurement made at the second power level detector **403** to the microcontroller **311** in the ground-based equipment **300**. The microcontroller **311** in the ground-based equipment **300** compares the power level measured at the output of the transmission pre-amplifier **309** with the power level measured at the input to the high power amplifier **304** in the mast head unit **320**. The microcontroller **311** then adjusts the first variable cable attenuator **401** to maintain a constant power level at the input to the high power amplifier **304**, and makes an identical adjustment to the second infinitely variable cable attenuator **404** to compensate for the effect of variable cable loss on the received signal. The control system comprising ground-based power level detector **402**, mast head unit power level detector **403**, the first and second variable cable attenuators **401**, **404**, mast head microcontroller **305**, and ground-based unit microcontroller **311** provides a continuous automatic adjustment for the variable loss associated with the RF cable **340**.

An alternate embodiment of the invention combines cell size attenuator **308** with cable compensation attenuator **401**, whereby the attenuation range of the combined attenuator is sufficiently large to accommodate the range required by both of the attenuators **308**, **401**.

**Figure 4** shows the procedure **400** for cable loss compensation **400** which adjusts cable compensation attenuators **401**, **404** in accordance with the present

invention. The cable compensation method **400** is designed to adjust cable loss to between a predetermined lower limit, (A), and a predetermined upper limit, (B). In this procedure **400**, cable loss includes the effect of the first cable compensation attenuator **401**. At step **410**, a measurement of cable loss (L) is made by comparing the RF power level measured at the first power detector **402** with the RF power level measured at the second power level detector **403**. At step **412**, cable loss L is compared to predetermined limits lower and upper limits A and B respectively. If the cable loss L is between lower limit A and upper limit B, or is equal to either limit, then no further adjustment is made and the cable loss compensation procedure terminates at block **414**. If the cable loss L is either higher than upper limit B or lower than lower limit A, then a further comparison is made a step **416**. At step **416**, a determination is made whether the cable loss L is lower than lower limit A. If so, then the gain of the cable attenuators **402, 403** is decreased, as shown at step **420**. If the cable loss L is not lower than lower limit A, it must be higher than upper limit B, and the gain of the cable attenuators **402, 403** is increased as shown at step **418**. Upon completion of an increase or decrease of cable loss compensator gain at step **418** or **420**, cable loss L is again measured at block **410**. This procedure is repeated until cable loss L is brought within the predetermined limits A, B and the compensation procedure terminates at step **414**. The cable compensation procedure **400** may be performed on a repeated basis at a rate which is appropriate for maintaining constant output power under conditions which cause cable loss L to fluctuate.

Although the invention has been described in part by making detailed reference to certain specific embodiments, such details is intended to be instructive rather than restrictive. Although the invention has been described in the preferred embodiment for use in a CDMA communication system, it is equally applicable to other types of communication systems such as Timed Division Duplex (TDD), Frequency Division Duplex (FDD), Multimedia Distribution System (MDS), Local Multipoint Distribution Systems (LMDS), Unlicense National Information Infrastructure/National Information Infrastructure (UNII/NII), next generation and other cellar radio communication systems. It will be appreciated by those skilled in the art that many variations may be made in the structure and mode of operation without departing from the spirit and scope of the invention as disclosed in the teachings herein.

* * *

What is claimed is:

1. An attenuation compensation system for use in a base station having a mast head unit remotely connected to ground-based equipment by a cable, whereby a signal sent from said ground-based equipment to said mast head unit experiences attenuation, the system comprising:

at said ground-based equipment (300):

a first power level detector (402) coupled to a transmit signal line for outputting a first power level signal;

a compensation attenuator (401) coupled to the transmit signal line;

at least one controller for controlling the compensation attenuator (401); and

at said mast head unit (320):

a second power level detector (403) coupled to the transmit signal line for outputting a second power level signal, said second power level detector having means for transmitting the second power level signal to said ground-based equipment; said second power level signal being based upon the amount of said attenuation;

whereby said controller (301) compares said first and second power level signals and controls the compensation attenuator (401) accordingly.

2. The attenuation compensation system as recited in claim 1 further comprising a second compensation attenuator (404) coupled to a receive signal line.

3. The attenuation compensation system as recited in claim 2 wherein the controller (311) controls the second compensation attenuator (404).

4. The attenuation compensation system as recited in claim 1 further comprising a power and control cable (350) connected between the mast head unit and the ground-based equipment for carrying control signals between the first and second power level detectors (402, 403).

5. The attenuation compensation system as recited in claim 2 further comprising a first diplexer (307) located in the ground-based equipment and coupled to the receive signal line, the transmit signal and the cable.

6. The attenuation compensation system as recited in claim 1 wherein the ground-based equipment further comprises a cell size attenuator (308) coupled to the transmit signal line.

7. The attenuation compensation system as recited in claim 1 wherein the ground-based equipment further comprises a transmit pre-amplifier coupled (309) to the transmit signal line.

8. The attenuation compensation system as recited in claim 2 further comprising a second diplexer (301) located in the mast head unit and coupled to the receive signal line, the transmit signal line and the cable.

9. The attenuation compensation system as recited in claim 1 wherein the mast head unit further comprises a high power amplifier (304) coupled to the transmit signal line.

10. The attenuation compensation system as recited in claim 2 wherein the mast head unit further comprises a low noise amplifier (302) coupled to the receive signal line.

11. The attenuation compensation system as recited in claim 2 wherein the mast head unit further comprises an antenna diplexer (303) coupled to an antenna (360), the transmit signal line, and the receive signal line.

12. A method of compensating for cable loss in a wireless communication system having a high power amplifier (304) located proximate an antenna, a pre-amplifier (309) receiving a transmit signal located at a remote location, and a cable (340) connected between the amplifiers, the method comprising the steps of:

detecting a first power level of the transmit signal at an output of the pre-amplifier (309);

detecting a second power level of the transmit signal at an input of the high power amplifier (304);

feeding back the second power level from said proximate location to said remote location;

comparing, at said remote location, the first and second power levels to determine a loss in the cable;

adjusting a compensation attenuator (401) coupled to the pre-amplifier based upon the loss.

13. The method of compensating for cable loss as recited in claim 12 wherein a gain of the cable compensation attenuator (401) is increased if the loss is below a lower limit.

14. The method of compensating for cable loss as recited in claim 12 further comprising the steps of:

comparing the loss to upper and lower limits;

maintaining the gain of the cable compensation if the loss is between the limits;

increasing the gain of the cable compensation if the loss is below the lower limit; and,

decreasing the gain of the cable compensation if the loss is above the upper limit.

15. The method of compensating for cable loss as recited in claim 12 further comprising adjusting the gain of a second cable compensation attenuator (404) coupled to a receive signal based upon the loss.

16. An attenuation compensation system for use in a base station having at least one cable extending between first and second locations, the system comprising:

power level detection means for determining transmit signal power level at said first location and at said second location;

feed back means for feeding back the transmit signal power level from said second location to said first location;

comparing means at the first location for comparing power levels from the power level detection means and for determining a loss between the two locations;

attenuating means at the first location for controlling the power level of the transmit signal; and,

control means at the first location responsive to the comparing means for controlling the attenuating means.

FIG. 1

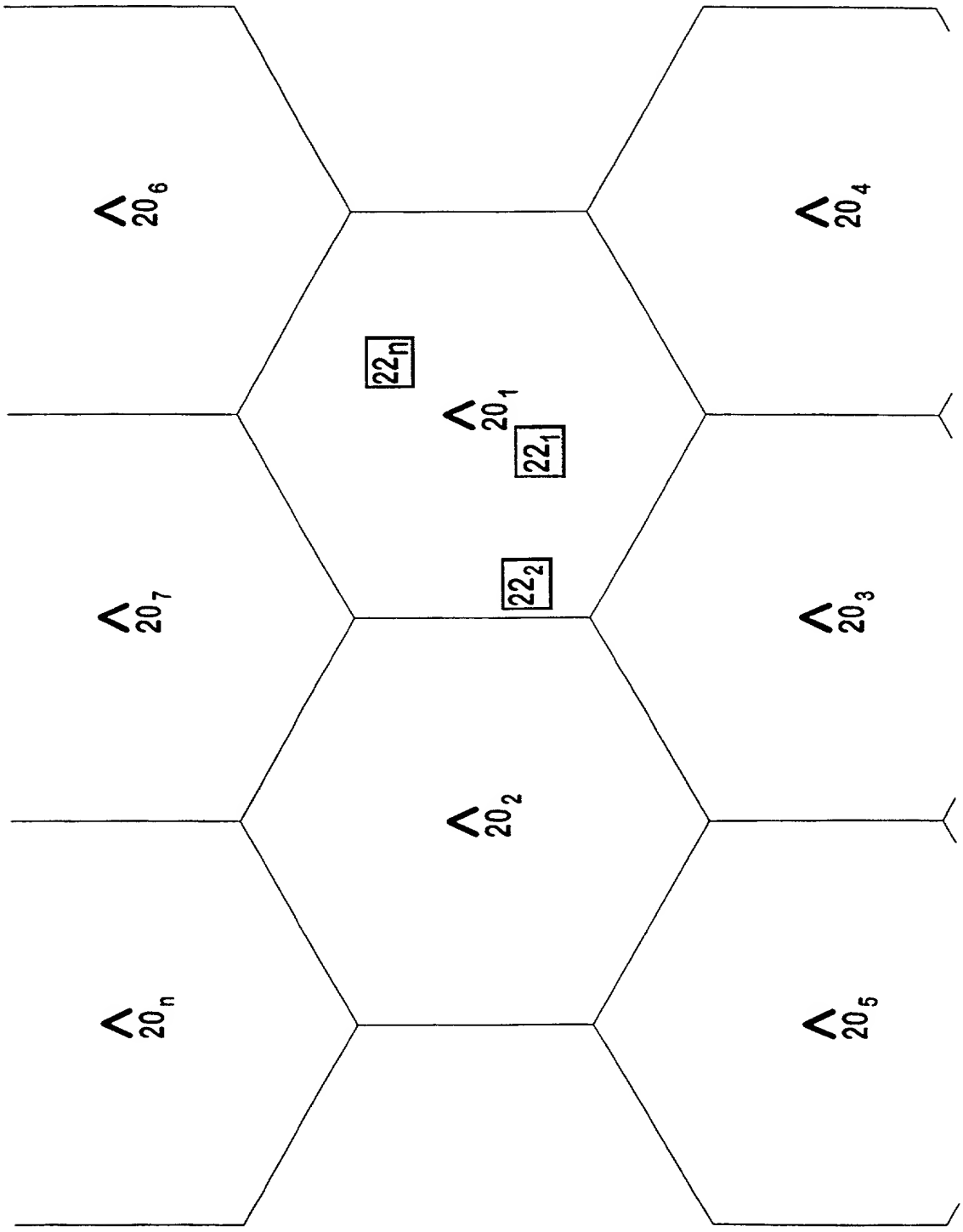
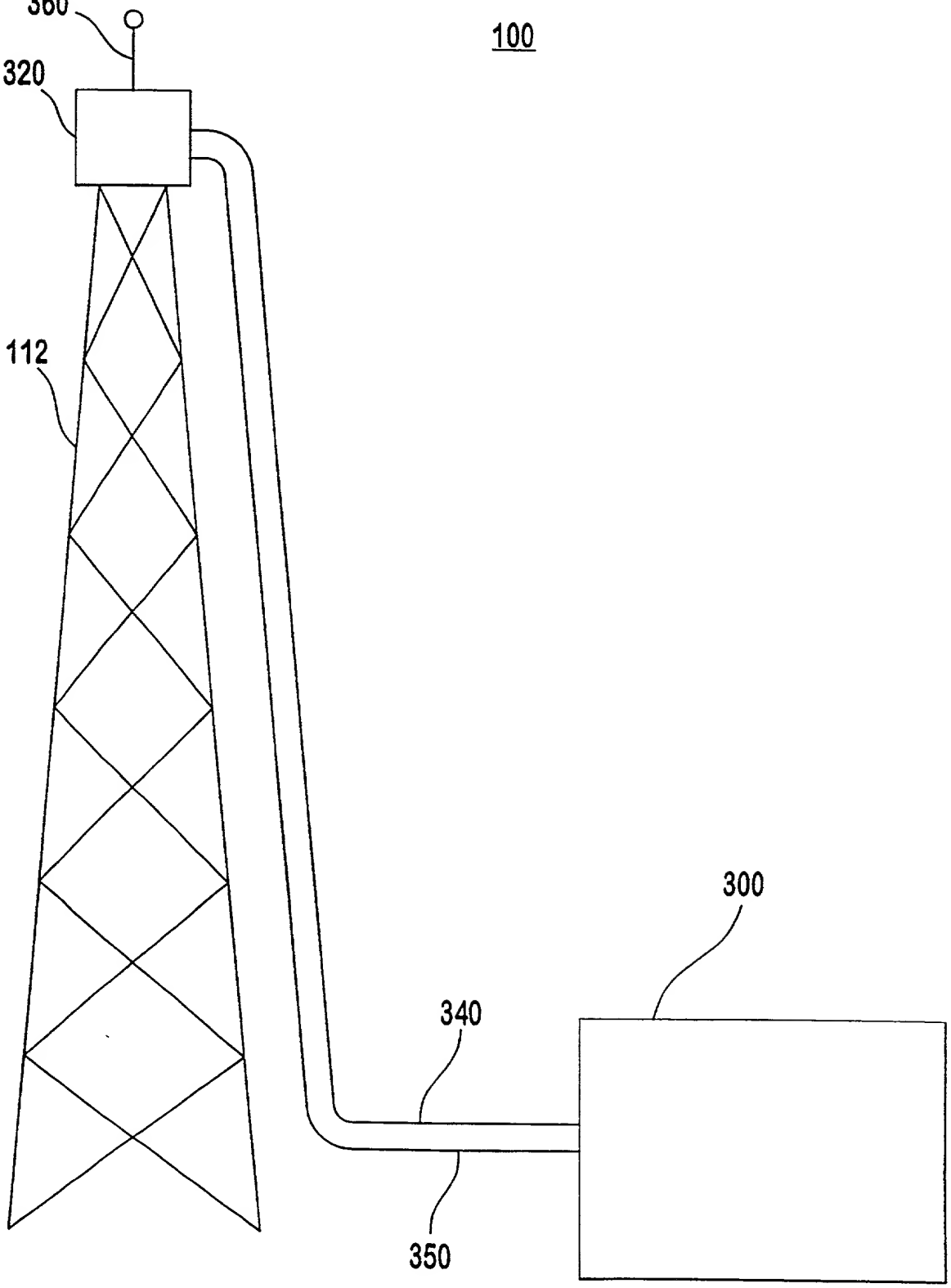


FIG. 2



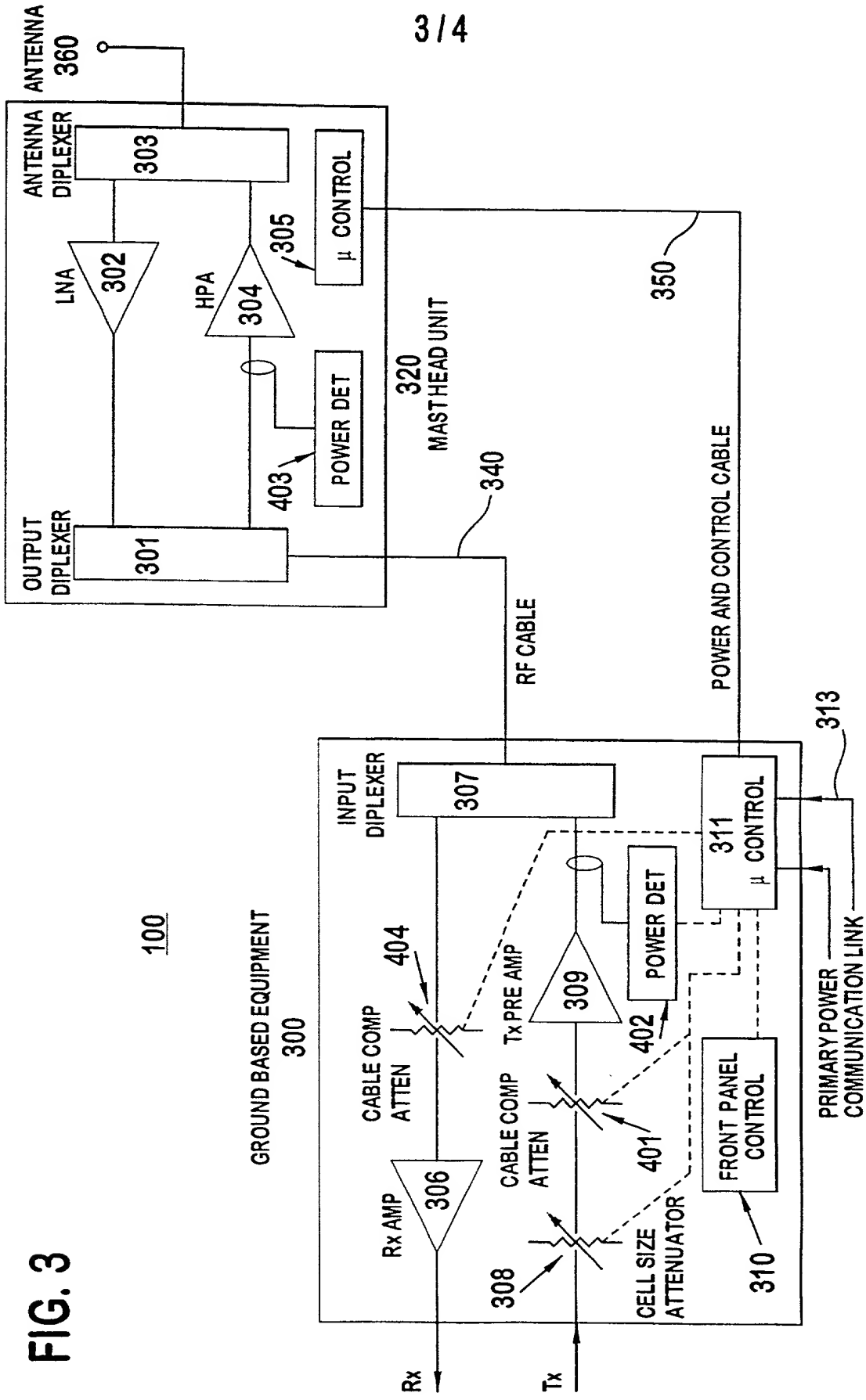
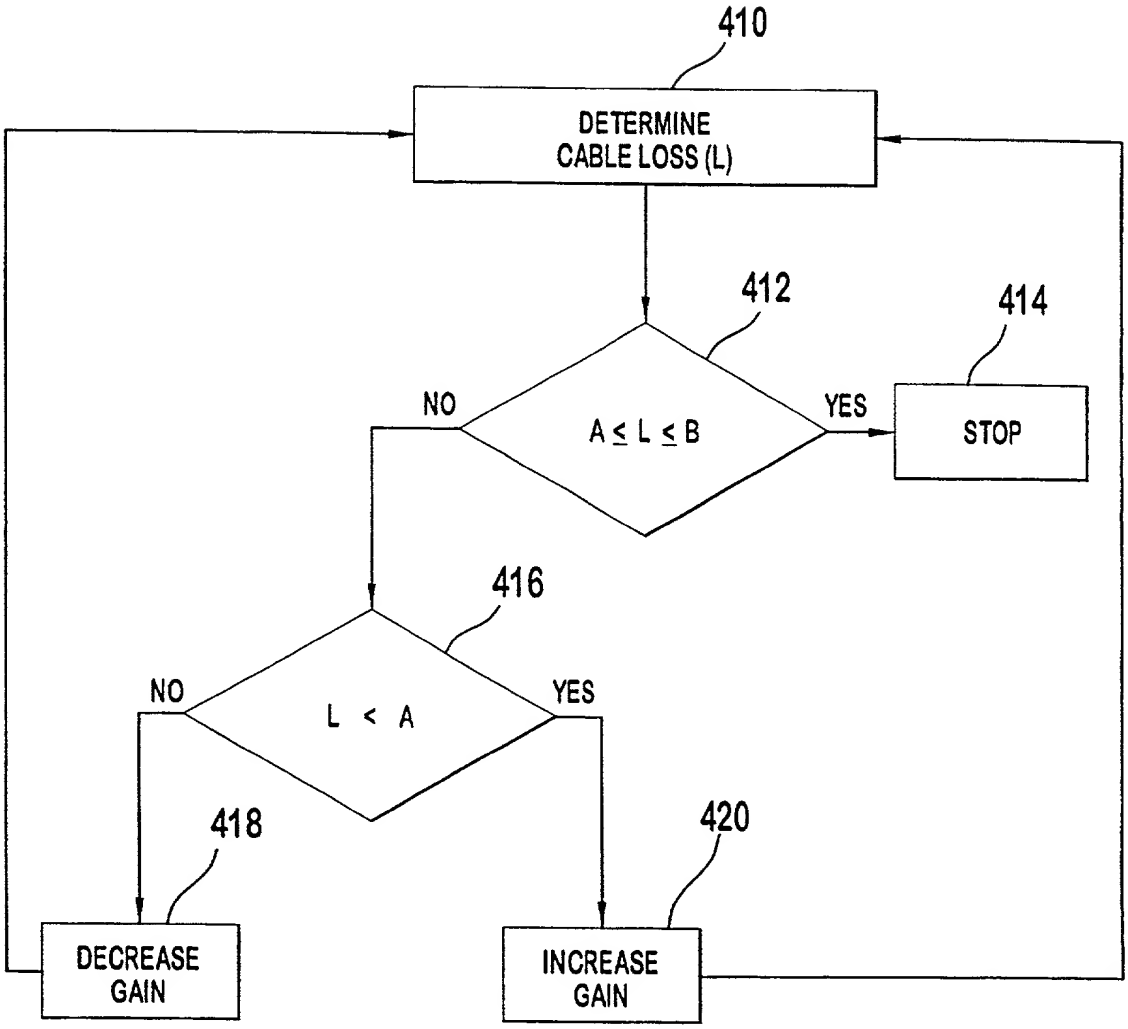

ANTENNA
360
ANTENNA DIPLEXER
303
LNA
302
HPA
304
305
μ CONTROL
350
320
MAST HEAD UNIT
POWER DET
403
OUTPUT DIPLEXER
301
340
RF CABLE
POWER AND CONTROL CABLE
313
INPUT DIPLEXER
307
311
μ CONTROL
100
GROUND BASED EQUIPMENT
300
404
CABLE COMP ATTEN
Tx PRE AMP
309
POWER DET
402
PRIMARY POWER COMMUNICATION LINK
CABLE COMP ATTEN
401
FRONT PANEL CONTROL
Rx AMP
306
308
CELL SIZE ATTENUATOR
310
Rx
Tx

FIG. 3

FIG. 4




400
410
DETERMINE CABLE LOSS (L)
412
414
NO
A ≤ L ≤ B
YES
STOP
416
NO
L < A
YES
418
420
DECREASE GAIN
INCREASE GAIN

Express Mail Label No. EL722983720US

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# DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

[X] Declaration Submitted with Initial Filing OR [ ] Declaration Submitted after Initial Filing (surcharge (37 CFR 1.16 (e)) required)

| | |
|---|---|
| **Attorney Docket Number** | I-2-127.1US |
| **First Named Inventor** | Bird et al. |
| ***COMPLETE IF KNOWN*** | |
| Application Number | Not Yet Known |
| Filing Date | Not Yet Known |
| Group Art Unit | Not Yet Known |
| Examiner Name | Not Yet Known |

**As a below named inventor, I hereby declare that:**

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

COMMUNICATION STATION WITH AUTOMATIC CABLE LOSS COMPENSATION

*(Title of the Invention)*

the specification of which
[X] is attached hereto
OR
[ ] was filed on (MM/DD/YYYY) [ ] as United States Application Number or PCT International Application Number [ ] and was amended on (MM/DD/YYYY) [ ] (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

| Prior Foreign Application Number(s) | Country | Foreign Filing Date (MM/DD/YYYY) | Priority Not Claimed | Certified Copy Attached? YES | NO |
|---|---|---|---|---|---|
| | USA | | [ ] | [ ] | [ ] |
| | | | [ ] | [ ] | [ ] |
| | | | [ ] | [ ] | [ ] |
| | | | [ ] | [ ] | [ ] |

[ ] Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

| Application Number(s) | Filing Date (MM/DD/YYYY) | |
|---|---|---|
| 60/118,824 | 02/05/1999 | [ ] Additional provisional application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto. |



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# DECLARATION — Utility or Design Patent Application

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

| U.S. Parent Application or PCT Parent Number | Parent Filing Date (MM/DD/YYYY) | Parent Patent Number (if applicable) |
|---|---|---|
| PCT/US99/30652 | 12/23/1999 | |

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As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: ☒ Customer Number 24374 → Place Customer Number Bar Code Label here
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☐ Registered practitioner(s) name/registration number listed below

| Name | Registration Number | Name | Registration Number |
|---|---|---|---|
| Namely, the Attorneys of Volpe and Koenig, P.C. | | | |

☐ Additional registered practitioner(s) named on supplemental Registered Practitioner Information sheet PTO/SB/02C attached hereto.

Direct all correspondence to: ☒ Customer Number or Bar Code Label 24374 OR ☐ Correspondence address below

| | | | | | |
|---|---|---|---|---|---|
| Name | VOLPE AND KOENIG, P.C. DEPT ICC | | | | |
| Address | | | | | |
| Address | | | | | |
| City | | State | | ZIP | |
| Country | | Telephone | | Fax | |

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**Name of Sole or First Inventor:** ☐ A petition has been filed for this unsigned inventor

| Given Name (First and middle [if any]) | Family Name or Surname |
|---|---|
| John | Bird |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Inventor's Signature | John F. Bird | | | | | Date | 7/26/01 |
| Residence: City | Huntington Station | State | NY | Country | USA | Citizenship | US |
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☒ Additional inventors are being named on the 1 supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto

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# DECLARATION

**ADDITIONAL INVENTOR(S)**
**Supplemental Sheet**
Page 1 of 1

| Name of Additional Joint Inventor, if any: | ☐ A petition has been filed for this unsigned inventor |
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| Name of Additional Joint Inventor, if any: | ☐ A petition has been filed for this unsigned inventor |
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| | |
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